

# Pyrometers for Clay Burners

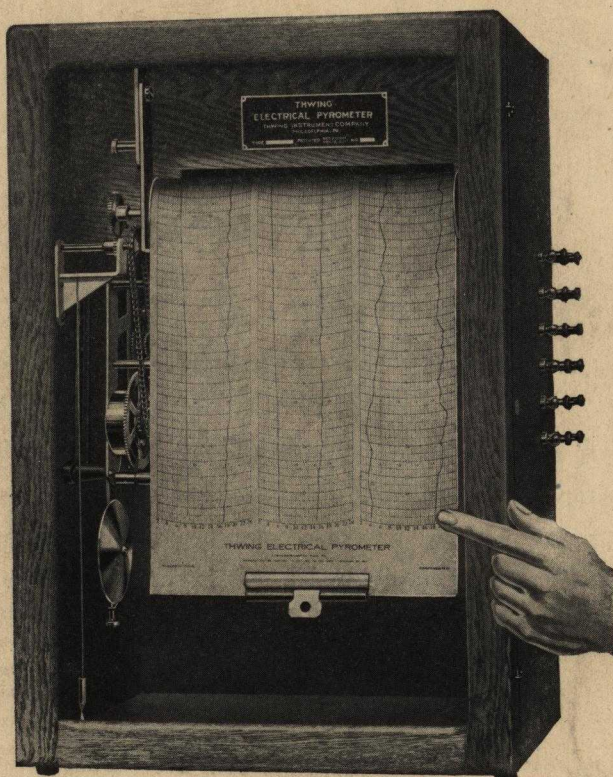


Fig. 1—Three-Galvanometer Six-Record Recorder

Giving separate and easily distinguishable records from six kilns or other heat sources on One Straight Chart. Also particularly adapted for recording two points in each of three separate kilns.

## THWING INSTRUMENT COMPANY

3339-41 LANCASTER AVENUE  
PHILADELPHIA, PA.

NEW YORK OFFICE  
59 PEARL ST.

### AGENCIES

ADOLF FRESE OPTICAL CO.  
LOS ANGELES  
CALIFORNIA

GEIJSBEEK ENGINEERING CO.  
PORTLAND  
OREGON

JAMES DE VON  
227 DAVENPORT ROAD  
TORONTO



## FOREWORD

**T**HWING PYROMETERS are manufactured under patents granted to the inventor, Charles Burton Thwing, Ph. D., and assigned by him to the Thwing Instrument Co., being in various types and styles to suit all temperatures and temperature conditions of commercial practice, as well as serve the individual requirements or desires of the customer.

This booklet briefly describes and illustrates both recording and indicating instruments especially adapted for use in clay burning.

Much descriptive and other detail which appears in our General Catalog has been omitted. Copy of this catalog will be gladly mailed on request.



***Why You Should  
Use Pyrometers***

Accurate heat measurements make for uniformity of product with minimum consumption of fuel.

In nearly every instance large savings in fuel consumption are effected.

The reduction in amount of seconds produced often pays the cost of pyrometers in a few months.

They eliminate guesswork and inspire confidence in the workmen.

They enable valuable information to be obtained which can be gotten in no other way and put the superintendent in possession of facts which are of the utmost importance in the successful operation of the plant.

**In brief: They make for economy in plant operation.**

***Why You Should Use  
Thwing Pyrometers***

Thwing Pyrometers enable all of the foregoing advantages to be obtained for the minimum cost of original installation as well as for upkeep.

They are the product of over ten years' experience in meeting the requirements of hundreds of users, succeeding a long period of research in college laboratories.

The Multiple Record feature, together with the employment of High Resistance Galvanometers and best grade of both workmanship and materials throughout, combine in our instruments accuracy and ruggedness with compactness and simplicity.

**They make for the MAXIMUM economy in plant operation.**

**THIS MEANS MONEY FOR YOU**



**Thermocouples** A THERMOCOUPLE consists of two rods or wires of suitable unlike metals, welded together to form a junction, which is usually protected with a tube of refractory material and inserted in the heat.

The free ends, commonly called the Cold Ends, of the rods or elements of the couple are connected by copper wires to a GALVANOMETER (Millivoltmeter), which indicates the current generated in the thermocouple by the heat. No battery or other external source of current is used.

Thermocouples are generally distinguished by the terms BASE METAL and RARE METAL, the former employing elements of nickel alloy, and the latter, elements consisting most usually of Platinum and an alloy of Platinum—10% Rhodium.



Fig. 2—Type A7 E. Heavy Elements of Base Metal

Illustrates the type of Thermocouple most generally used for installation in kilns, being protected in Duro-Porcelain.



Fig. 3—Duro-Porcelain

For protection of our standard Heavy Base Metal Thermocouples.



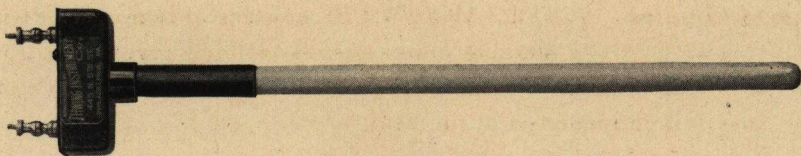


Fig. 4—Type A4 C

Illustrates most common style of Platinum Thermocouple—employed only for the highest temperatures. Further protected in some form of carborundum or fire clay.

***Choice of  
Thermocouples***

Much has been said, both in technical journals and society proceedings, on the relative merits of Base Metal and Platinum Thermocouples. Our long experience has convinced us that the form of Base Metal Thermocouple which we employ may be quite successfully used in nearly every ceramic installation, thus giving the customer the benefit of efficient service at the lowest possible cost.

It must not be inferred that we cannot, or will not, furnish Platinum Thermocouples whenever the case demands, or it is the particular desire of the customer to employ them.

The reader is referred to an address by this company's President, Charles Burton Thwing, Ph. D., before the Iowa Clay Products Manufacturers' Association, January 18, 1917, which bears largely on this question. This address is in folder form and will be sent on request.

***Manner of  
Installation***

It is customary to insert one thermocouple in the crown of each down-draft kiln, but in some types of kilns, such as the rectangular and compartment, two or more thermocouples are often employed, both in the tops and bottoms.



### ***Choice of Recording Instruments***

Complete description of the construction and operation of Thwing Recorders will be found in General Catalog, No. 8.

These recorders are constructed with one, two or three galvanometers. Single galvanometer instruments have a capacity of 1, 2 or 3 records on the same 5" chart section at a frequency of 1, 3½ or 7 minutes, respectively. Two and three galvanometer instruments record on 10" charts, with 2 and 3 sections, respectively. Thus, the total capacity of a 3-galvanometer recorder, giving 3 records per galvanometer, would be 9 records, at intervals of 7 minutes.

The 3-galvanometer, 6-record recorder, illustrated on front cover of this booklet, will either give records from 6 separate kilns with one thermocouple in each, or 2 records appearing side by side for ready comparison, from 2 points in each of 3 separate kilns. This same style of instrument may be arranged to give 3 records on each chart section from 3 points in each of 3 kilns.

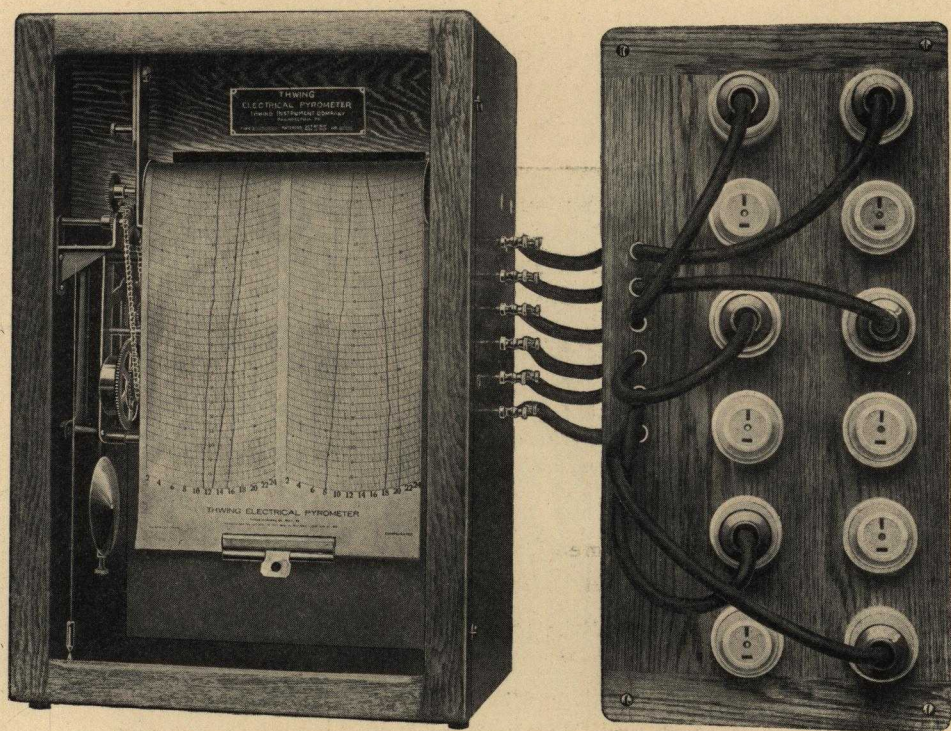
The 2-galvanometer, 6-record instrument, illustrated on page 7, gives 6 records from 6 separate kilns, same as the instrument above described. It may also be employed to record 2 points in each of 3 separate kilns, having one series of corresponding points appear on one chart section and another series on the other. For instance, the tops could appear on the left-hand section and the bottoms on the right.

See Table of Data and Prices of Recorders—page 7.

The ready availability of Thwing Recorders in any practical combination makes possible their most economical and satisfactory application for any case in question.

Inquiries regarding the selection of suitable apparatus are kindly solicited and recommendations gladly furnished, together with best prices.





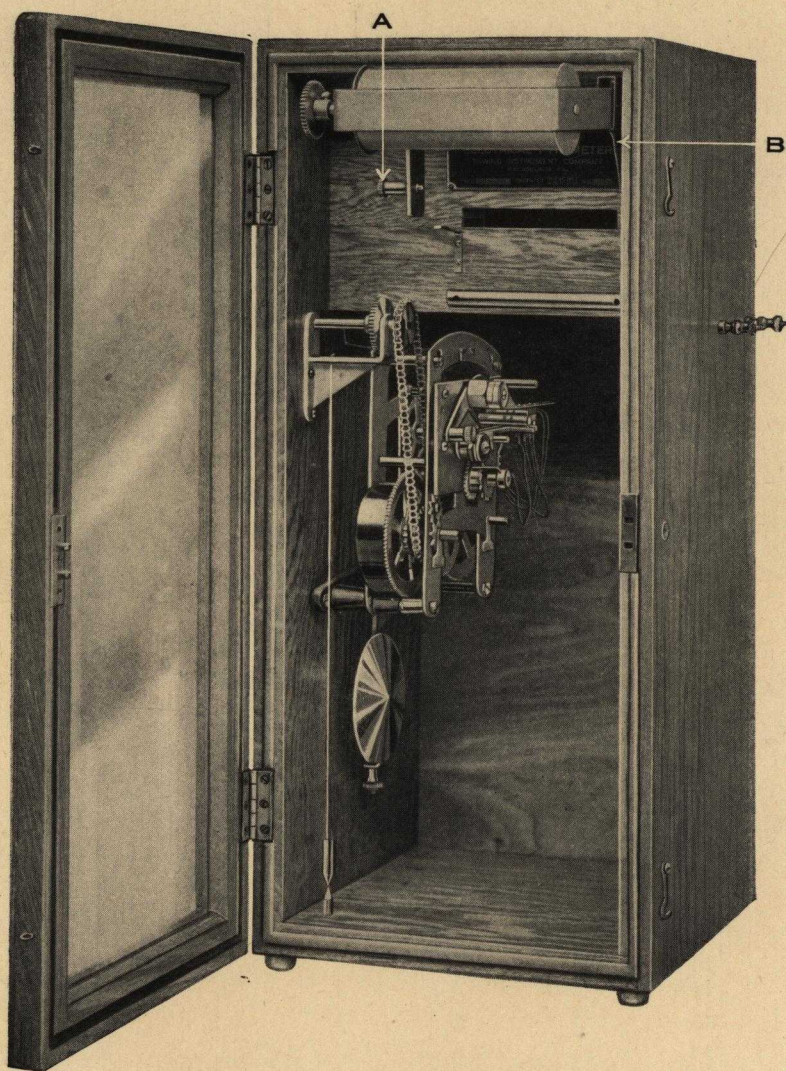
**Fig. 5—Two-Galvanometer Six-Record Recorder**  
**Showing Receptacle Switch Arrangement, which enables Recorder to be connected to any**  
**six of twelve Kilns or other Heat Sources at one time**

### PRICE LIST OF RECORDERS

Catalog Number	Number of Galvanometers	Total Number of Records	Frequency of Record	Chart Width	Net Price
111	1	1	1 min.	5"	\$100.00
112	1	2	3 "	5"	135.00
113	1	3	7 "	5"	155.00
221	2	2	1 "	10"	165.00
222	2	4	3 "	10"	215.00
223	2	6	7 "	10"	255.00
231	3	3	1 "	10"	195.00
232	3	6	3 "	10"	265.00
233	3	9	7 "	10"	325.00

One Hundred Charts are included with each Recorder.  
 All prices Net, F. O. B. Philadelphia.

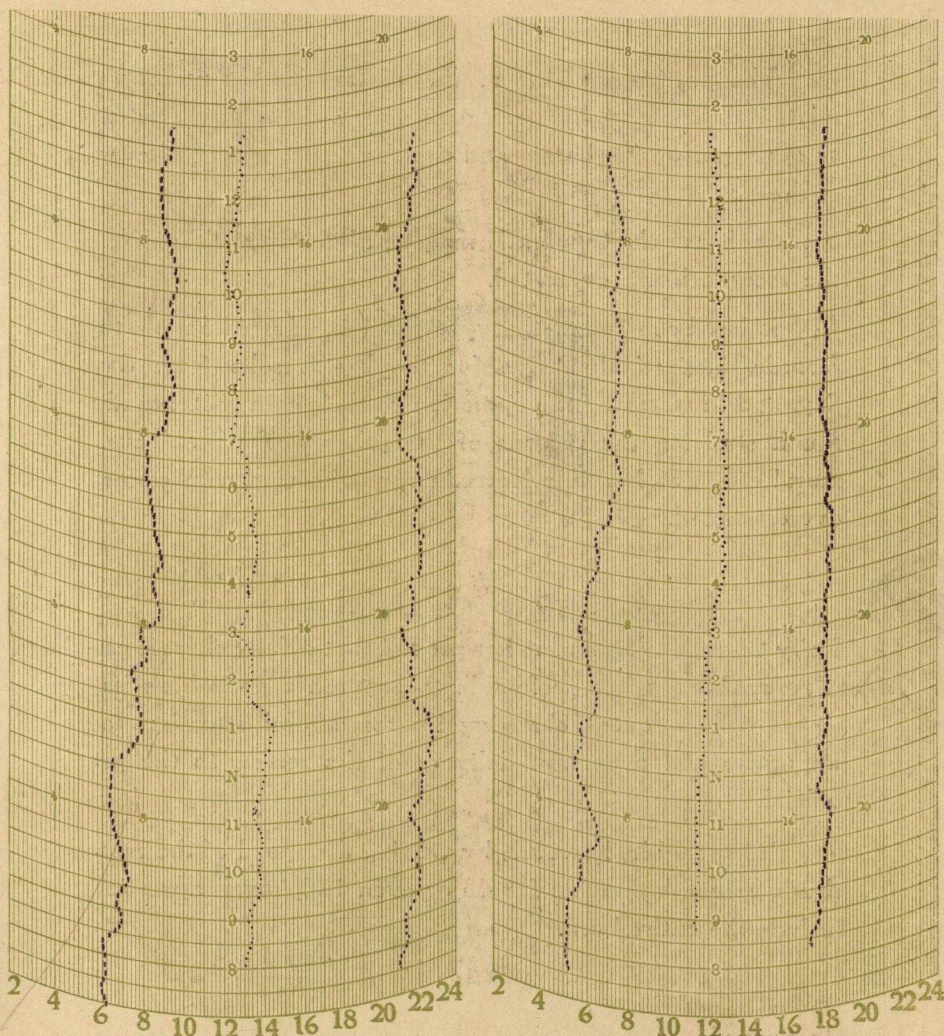




**Fig. 6—Single-Galvanometer Recorder**

**Showing Clock and Contact Mechanism; also Position of Drum when Changing Chart  
A and B represent parts to be manipulated when raising or lowering drum**





# THWING ELECTRICAL PYROMETER

THWING INSTRUMENT CO., PHILA. PA.

PATENTED OCT. 29, 1907-NOV. 12, 1907-DEC. 10, 1912-DEC. 1, 1914-APR. 27, 1915

HUNDREDS FAHR

COMPENSATED

**Fig. 7—Specimen Records—Half Size**  
**From a Two-Galvanometer, Six-Record Recorder. Showing the ease of distinguishing and comparing three records on one Chart section**



***Advantage of  
Straight Charts***

The charts employed on Thwing Recorders are straight, and the records, as completed, are before the observer all the time, in a readable position.

The particular value of this system is that records from related sources may be seen at a glance by the superintendent or other person in charge, and the comparative operation noted at once.

Such correlated records may be filed away without fear of the records being separated.

It has been found that workmen, if allowed access to the records, instinctively strive for the best results from day to day, and in watching the operation of their own unit, are always found studying the records of the other workmen. Thus, the moral effect of Multiple Records upon the workmen cannot be overestimated.

***The Daily Chart  
Most Preferable***

Experience has proved that a daily chart is usually most preferable to any other period, as its frequent changing insures careful attention to the apparatus and a prompt delivery of the record to the proper official.

It is possible, however, by varying the speed of the recorder drum, to employ charts for 48 or even 120 hours' operation, to include the entire burn.

***Legible Records***

Records made distinguishable by different colors are not easy to distinguish by artificial light. The sharp contrast in form between the light and heavy lines and dots of Thwing Records is equally clear in lamplight or daylight. A drop of ink added to the pad once a week is all that is required to insure a clear, strong record. There are no expensive ribbons or carbon sheets to get faint and require renewal.



***Choice of  
Indicating  
Apparatus***

We supply only the best grade High Resistance type of Indicator. When it is desired to locate the recording instrument in the Superintendent's office, an Indicator is placed in a position convenient for burner's observation.

When no records at all are desired, the Indicator alone may be used successfully. The automatically written record is, however, the source of greater satisfaction.

Indicators are furnished with dial switch, which enables readings to be taken from all of the thermocouples installed.

An indicator serves as a check on the readings afforded by recorder.

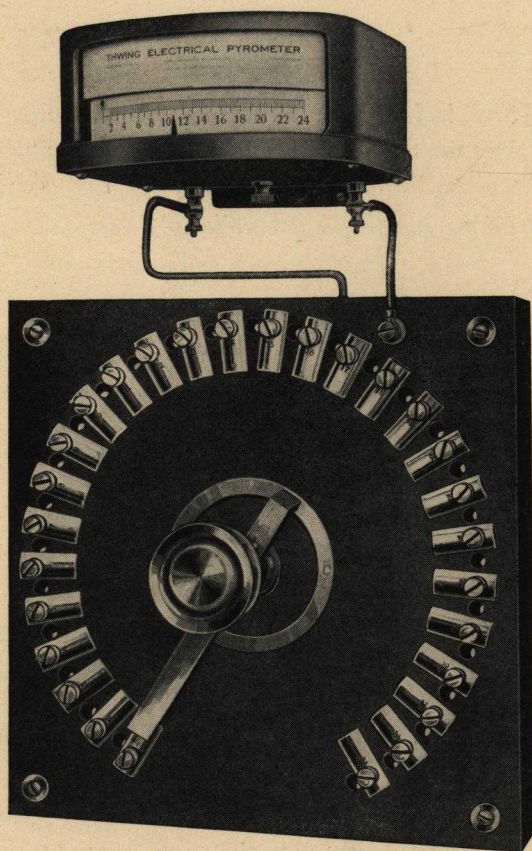


Fig. 8—Indicator and Dial Switch

This switch is of special construction and consists of massive slate base, brass contact circle, laminated phosphor-bronze contact springs and all necessary adjusting parts.



## PRICE LIST

### INDICATOR, DIAL SWITCH AND DUSTPROOF CASE

Number of Points	Price	Number of Points	Price
4	\$62.00	18	\$70.50
6	63.50	20	71.50
8	64.50	22	73.00
10	65.50	24	74.00
12	67.00	26	75.50
14	68.00	28	76.50
16	69.50	30	77.50

Indicator alone, \$50.00

A Portable Indicator with especially designed thermocouple for the convenient observation of temperatures at different points in the plant can be furnished for price of \$60.00.

All Prices Net, F. O. B. Philadelphia.

## APPROXIMATE COST OF EQUIPMENT

Includes Recorder Only, One Thermocouple per Kiln  
with Protecting Tube and Receptacle Switch

KILNS FIRED AT ONCE	TOTAL NUMBER OF KILNS								
	1	2	3	4	6	10	15	20	30
1.....	108	121	131	236	139	156	191	279	366
2.....	...	151	167	175	192	227	272	315	402
3.....	...	...	179	196	213	248	293	336	423
4.....	...	...	...	247	274	309	354	397	484
6.....	...	...	...	...	303	351	396	439	526
8.....	...	...	...	...	...	528	573	616	703
10.....	...	...	...	...	...	...	615	658	745
12.....	...	...	...	...	...	...	657	700	787
16.....	...	...	...	...	...	...	...	930	1006

These prices are approximate only and include that combination of apparatus which affords the lowest cost.

Prices cover Base Metal Thermocouples and Protecting Tubes of length not exceeding 24".



Other arrangement of Recorders to give different combination of records, or records at shorter intervals, may increase these prices somewhat.

With two or more Thermocouples in each kiln, the number of records, as well as the total number of Thermocouples, will be increased; consequently, the price will be higher.

Indicating Equipment may be figured separately, according to above prices, assuming the approximate price of Base Metal Thermocouples not exceeding 24" in length to be \$8.00 each, and of Platinum Thermocouples, same length, \$45.00 each.

**Wiring** The cost of wiring has not been included in above list, as it is customary for the purchaser to furnish the necessary wire and install according to our directions. This wire may be ordinarily purchased locally at a price as cheap as we could quote, and the cost of transportation would thus be saved.

For the purpose of aiding in the selection and purchase of wire, we give the following:

One wire passes from the positive terminal of each thermocouple to its respective receptacle on switchboard, located beside recorder.

One Common Return wire connects all of the negative terminals of each thermocouple with all of the negative binding posts of recorder.

Where indicator is also used, one positive branch line is tapped off from each positive line going to recorder, at the most convenient point, and connected to its respective dial switch point. One Common Return is connected between negative terminal of Indicator and Common Return to Recorder.

For distances up to 400 feet, No. 14 B. & S. gauge positive wire may be used, and No. 12 B. & S. Common Return.

For distances exceeding 400 feet, No. 12 B. & S. positive should be employed, and No. 10 B. & S. Common Return.



# Some Prominent Users of THWING PYROMETERS

Abrasive Materials Co. ....	Bridesburg, Phila.	Hydraulic-Press Brick Co....	Winslow Junction, N. J.
Acme Brick Company .....	Marietta, Ohio.	Hydraulic-Press Brick Co....	Washington, D. C.
Adel Clay Products Co. ....	Adel, Iowa.	Illinois Charcoal Chemical Co.	Ullin, Ill.
American Terra Cotta & Cer. Co. ....	Terra Cotta, Ill.	Jewettville Brick Co.....	Jewettville, N. Y.
Armstrong Cork Company...	Beaver Falls, Pa.	Kane Brick Co.....	Kane, Pa.
Ashland Fire Brick Co.....	Ashland, Ky., 3 plants.	Ludowici-Celadon Co.....	New Lexington, Ohio.
Atlantic Terra Cotta Co.....	Perth Amboy, N. J.	Logan Pottery Co.....	Logan, Ohio.
Baker Clay Company.....	Grand Ledge, Mich.	Mayer China Co.....	Beaver Falls, Pa.
Beaver Falls Art Tile Co....	Beaver Falls, Pa.	Milton Brick Company.....	Milton, Pa.
Bickford Fire Brick Co.....	Curwensville, Pa.	Murphysboro Paving Brick Co. ....	Murphysboro, Ill.
Buckeye Firebrick & Clay Co.	Scioto Furnace, O.	New Florence Fire Brick Co.	New Florence, O.
Cambria Clay Products Co...	Blackfork, O. 2 plants.	N. Y. Architectural Terra Cotta Co. ....	Brooklyn, N. Y.
Carlyle Paving Brick Co....	Portsmouth, O.	Oak Hill Fire Brick Co.....	Oak Hill, Ohio.
Center Brick & Clay Co....	Orviston, Pa.	Ohio Fire Brick Co.....	Oak Hill, Ohio.
Clymer Brick & Fire Clay Co.	Clymer, Pa.	Pacific Sewer Pipe Co.....	Los Angeles, Cal.
Crescent Brick Co.....	Red Bank, N. J.	Provincial Secretary's Dept..	Mimico, Ont.
Cuban-American Sugar Co...	Chaparra, Cuba.	Price's, Ltd. ....	Toronto, Ont.
Darlington Clay Products Co.	Darlington, Pa.	Pyro Clay Products Co.....	Oak Hill, Ohio.
Davis Fire Brick Co.....	Oak Hill, Ohio.	Puritan Brick Company.....	Hamden, Ohio.
Diamond Brick Co.....	Oak Hill, Ohio.	Peekskill Fire Brick Co.....	Peekskill, N. Y.
Wm. E. Dee Clay Products Co. ....	Oak Hill, Ohio.	Peoria Brick & Tile Co.....	Peoria, Ill.
Didier-March Co. ....	Perth Amboy, N. J.	Ridgway Brick Co.....	Ridgway, Pa.
Jos. Dixon Crucible Co.....	Jersey City, N. J.	Rookwood Pottery .....	Cincinnati, Ohio.
Dominion Abrasive Wheel Co.	Toronto, Ont.	Ross-Tacony Crucible Co....	Tacony, Pa.
Dominion Sewer Pipe Co....	Swansea, Ont.	St. Lawrence Brick Co.....	Laprairie, Que.
Dressler-American Company.	New Castle, Pa.	Sanitary Earthenware Spec. Co. ....	Trenton, N. J.
Eureka Brick Company.....	Richmond, Va.	Scott Brick Process Co.....	Knoxville, Tenn.
Fallston Fire Clay Co.....	New Brighton, Pa.	Sebring China Pottery Co....	Sebring, Ohio.
Fulton Brick Works.....	Richmond, Va.	Standard Brick Co.....	Charleston, W. Va.
German-American Stoneware Co. ....	Keasbey, N. J.	Star Porcelain Co.....	Trenton, N. J.
Gladbrook Press. Brick & Tile Co. ....	Gladbrook, Iowa.	Straitsville Imper. Brick Co.	New Straitsville, Ohio.
Guernsey Earthenware Co...	Cambridge, Ohio.	Chas. Taylor & Son.....	McCall, Ky.
Guignard Brick Works.....	Columbia, S. C.	Thornton Fire Brick Co.....	Clarksburg, W. Va.
Hayes Run Fire Brick Co....	Orviston, Pa.	Thurber Brick Co.....	Thurber, Texas.
Heinz Roofing & Tile Co....	Denver, Col.	Trenton Fire Clay & Porce- lain Co. ....	Trenton, N. J.
Heron Lake Brick & Tile Co.	Heron Lake, Minn.	Tuttle Brick Co.....	Middletown, Conn.
Hocking Valley Brick Co....	Logan, Ohio.	Union Porcelain Works.....	Brooklyn, N. Y.
B. Mifflin Hood Brick Co....	Atlanta, Ga.	Upper Sandusky Tile Works.	Upper Sandusky, Ohio.
A. E. Hull Pottery Co.....	Crooksville, O.	Williams Grove Brick Co....	Bigler, Pa.
Hydraulic-Press Brick Co....	Cleveland, O.	O. Zimbal Brick Company...	Sheboygan, Wis.
Hydraulic-Press Brick Co....	Menomonie, Wis.		
Hydraulic-Press Brick Co....	St. Louis, Mo.		



## *What They Say*

We have saved many thousands of dollars by eliminating checked and soft brick.

HYDRAULIC-PRESS BRICK CO.

We know the temperatures of our kilns all the time. No more guess work.

STANDARD BRICK CO.

We have saved coal and have a cleaner, more uniform grade of material.

BICKFORD FIRE BRICK CO.

We burn in from twelve to thirty hours less time since we installed Thwing Pyrometers.

HAYES RUN FIRE BRICK CO.

The service is very satisfactory. We would not be without Thwing Pyrometers.

RIDGWAY BRICK CO.

We think mighty well of our outfit. It has made quite a hit with our burners.

STRAITSVILLE IMPERVIOUS BRICK CO.

By the use of the THWING Pyrometer Equipment we saved in our fuel alone during six months more than enough to pay for the installation twice over, to say nothing of the satisfaction of knowing at all times just what heat we had in our kilns and improved quality of our product.

THORNTON FIRE BRICK CO.



**GOLD MEDAL AWARD**



**PANAMA-PACIFIC EXPOSITION**



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